

CLAIMS

1 – Method for immobilizing microorganisms characterized in that an adequate nutrient supply for said microorganisms is incorporated into a medium for the fixation of the microorganisms and crosslinking of this support medium is carried out.

2 – Method as claimed in the preceding claim, characterized in that the nutrient supply is placed in the zone furthest from the external edge of the fixation medium of the microorganisms.

3 – Method as claimed in Claim 1 characterized in that the nutrient supply is physically separated into distinct zones, being located in the fixation medium of the microorganisms with a greater density in the zones furthest from the external edge of said medium.

4 – Method as claimed in one of the preceding claims characterized in that the nutrient supply includes a source of nitrogen (ammoniacal, amino, according to the microorganism), mineral salts (phosphates, sulfates, potassium, magnesium, among others), oligoelements (iron, copper, zinc, among other) and vitamins (thiamine, biotin, among others).

5 – Method as claimed in one of the preceding claims characterized in that complex nutrient sources are utilized, such as extracts of autolyzed yeasts.

6 – Method as claimed in any one of the preceding claims characterized in that the nutrient supply comprises a carbonaceous substrate, such as fermentable sugar or even a complete culture medium such as a must which may or may not be diluted.

7 – Method as claimed in one of the preceding claims characterized in that the nutrient supply is mixed with a polymer, in particular sodium alginate, capable of being transformed into a gel.

8 – Method as claimed in the preceding claim characterized in that the solution capable of being transformed into a gel has a polymer concentration varying between 1% and 3%.

9 – Method as claimed in one of the preceding claims characterized in that the layer(s) adjoining the nutrient supply is(are) formed from a solution capable of being transformed into a gel and microorganisms in suspension in this solution.

10 – Method as claimed in the preceding claim characterized in that the solution capable of being transformed into a gel has a polymer concentration varying between 1% and 50%.

11 – Method as claimed in Claims 9 and 10 characterized in that the microorganisms are yeasts or bacteria.

12 – Method as claimed in Claim 11 characterized in that strains of yeasts selected from *Saccharomyces cerevisiae* or *Saccharomyces uvarum* are utilized during bottle fermentation of sparkling wines or upon resumption of fermentation of musts displaying a slowing-down or stopping of alcoholic fermentation.

13 – Method as claimed in Claim 11 characterized in that yeasts from the genus *Schizosaccharomyces* are used during deacidification of acidic musts.

14 – Method as claimed in Claim 11 characterized in that the bacteria *Oenococcus oeni* or *Lactobacillus* are utilized during malolactic fermentation.

15 – Method as claimed in Claim 11 characterized in that yeasts from the genus *Candida* are utilized during bioconversion of xylose into xylitol.

16 – Method as claimed in one of the preceding claims characterized in that a sterile external layer without microorganisms and lacking permeability to the microorganisms existing in the fixation medium, is added to the fixation medium of the microorganisms simultaneously or after the crosslinking step of the latter.

17 – Method as claimed in the preceding claim characterized in that the external layer is comprised of a polymer which is identical in nature to the interior layers and capable of being transformed into a gel and with a concentration identical to that of the other layers.

18 – Method as claimed in Claims 16 and 17 characterized in that an enzymatic preparation or a preparation of organic compounds is introduced into the external layer.

19 – Method as claimed in the preceding claim characterized in that a lysozyme solution is added to said external layer, preventing the growth of undesirable species sensitive to this enzyme, especially lactic bacteria in winemaking.

20 – Method as claimed in Claim 18 characterized in that walls of yeasts are added to said external layer which will fix the fatty acids which are inhibitors of the activity of the fixed microorganisms during treatment to stop fermentation.

21 – Product with immobilized microorganisms characterized in that it includes a nutrient supply incorporated in the fixation medium of the microorganisms.

22 – Product as claimed in the preceding claim characterized in that it comprises three layers, the internal layer being formed by the nutrient supply, the intermediate layer being formed by the microorganisms and the fixation medium, and with the sterile external layer being without microorganisms and impermeable to the microorganisms listed.

23 – Method as claimed in Claims 1 to 20 for the production of the product as claimed in the preceding claim characterized in that the product is implemented in a single step with three layers by using concentric tubes which define two concentric annular zones around a central zone which is also concentric, and by carrying out the incorporation of the nutrient supply through the interior of the central tube, the incorporation of microorganisms and of the respective fixation medium through the annular zone defined by the external portion of the central tube and by the internal portion of the intermediate tube and by incorporating the external layer through the annular zone defined by the external portion of the intermediate tube and by the internal portion of the external tube.

24 - Method as claimed in the preceding claim characterized in that the crosslinking of the product, dispensed by the system of tubes, is carried out by passing the latter through a solution of a crosslinking agent.

25 - Method as claimed in the preceding claim characterized in that the polymer capable of being transformed into a gel is identical in nature in the three layers of the product, and in the case the latter is sodium alginate, the crosslinking agent is calcium chloride, thus by carrying out crosslinking of said product exclusively from the exterior towards the interior.

26 – Method as claimed in any one of Claims 23 to 25 characterized in that the product dispensed by the device of concentric tubes is cut by a vibration device, thus forming spheres.

27 – Method as claimed in any one of Claims 23 to 26 characterized in that the product subsequently undergoes partial dehydration to a final AW of 0.1 to 0.5, preferably 0.3 to 0.4, in particular by using a drying technique with fluidized bed or the use of ovens.

28 – Product as claimed in Claim 22, produced according to the method of Claim 26 characterized in that it has a spherical shape with three layers.

29 – Product as claimed in the preceding claim characterized in that the external diameter of the wet spheres is between 1 mm and 5 mm.

30 – Use characterized by the utilization of the product of any of Claims 21 to 22 or 28 to 29 for the fermentation of beverages in the bottle.

31 – Use characterized by the utilization of the product of any of Claims 21 to 22 or 28 to 29 for the resumption of fermentation of musts displaying a slowing-down or stopping of the alcoholic fermentation.